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Modification of phytoplankton group diversity over submesoscale fronts

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Over large parts of the ocean, submesoscale fronts are known to enhance total phytoplankton abundance because they are the location of intense vertical transport of nutrients. Disparate in situ observations suggest that such frontal dynamics not only affects the total biomass of phytoplankton, but also significantly modifies its composition. Here we make use of a newly developed algorithm able to distinguish a set of phytoplankton-specific pigments to statistically explore the change in phytoplankton community composition over basin-wide regions. We use 15 years of SST and reflectance data from the MODIS sensor on the Aqua satellite, at 1km and daily resolutions and focus on the oligotrophic North Atlantic subtropical gyre and on the more productive gulf stream region. We locate submesoscale fronts by computing an index quantifying SST patchiness. Our results confirm that submesoscale fronts are collocated with elevated Chlorophyll-a concentration and show significant changes in phytoplankton composition. These results underline the influence of submesocale dynamics on phytoplankton diversity, and stress the need to better understand the underlying mechanisms.